



COMMONWEALTH OF AUSTRALIA

PATENT SPECIFICATION

274254

29,799/63.

A43 D 15/00
Women Textile upper
Metal last.

Application Number 29,799/63.
Lodged 23rd April, 1963.

Class	Int. Cl.
44.55; 70.4; 44.53; 44.3.	A43d; B22d; A43b.

Complete Specification

Entitled IMPROVEMENTS IN OR RELATING TO THE MANUFACTURE OF
FOOTWEAR.

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Convention Priority 24th April, 1962, Great Britain, 15456.

Applicant

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LIMITED.

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Related Art:

202,676(8/54)	44.53; 44.3; 47.5.
207,336(7149/55)	44.50; 44.3; 47.5.
141,101(13,144/47)	44.3.

The following statement is a full description of this invention, including the best method of performing
it known to us :

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This invention relates to the manufacture of shoes and like articles of footwear, notably boots, slippers and sandals, hereinafter called shoes, wherein a shoe sole composed of a plastic material is mounted by injection-moulding to a lasted upper applied to the mouth of the mould by which the shoe sole is formed, the plastic material being injected in a hot molten condition into the mould, and wherein the upper is made of woven textile material, especially canvas.

In our work on the manufacture of canvas shoes in the manner described we have been confronted with the problem how to contrive that the hot plastic material will adhere with satisfactory bond strength to the canvas upper. It is thought that the hot plastic, immediately on coming into contact with the cool or comparatively cooler canvas, forms a skin which prevents the plastic from penetrating the interstices of the woven texture.

It has been found that satisfactory adherence can be achieved if the last on which the canvas upper has been lasted is directly heated to a suitable temperature before injection of the plastic material.

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According to one aspect of the present invention,
there is provided a method of manufacturing shoes having
woven textile uppers, by injection-moulding, whereby a
lasted upper having a sole portion is placed with said
5 sole portion in juxtaposition with a suitably shaped
mould, heating the lower portion of the last to a
temperature above the temperature which said lower
portion would reach by the natural transfer of heat
during an injection moulding operation or a succession
10 of said operations, and injecting plastic material in
a hot solten condition into the mould to form a shoe
outsole, whereby said hot plastic material penetrates
the intestices of said sole portion so that upon cooling
the outsole adheres to the sole portion of the upper.



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According to a further aspect of the invention, there is provided an injection moulding apparatus for performing the aforesaid method including a last incorporating means for directly heating at least the lower portion thereof, a mould adapted to fit a lasted upper having a sole portion, and means for heating plastic material to be injected into shoe outsole on said sole portion of the upper.

The invention also is a shoe of the type stated whenever made by the aforesaid method.

In performing the method according to the invention any thermoplastic material appropriate to the injection moulding may be used.

In an example, the last is formed with one or more long internal recesses extending along its bottom portion into which is or are inserted one or more electric heating elements adapted to heat at least the lower portion of the last to a suitable temperature, say about 100°C.

In the example, the shoe includes an upper-and-insole unit in the form of a sack, or sock, the insole being jointed to the upper by stitching or otherwise.

In the example, the mould comprises a base and a pair of separate side members which are slidable upon the base to adjoin at the toe and heel ends thereof and which, when they adjoin, form with the base a cavity having the shape of the ultimate plastic sole. The side members are formed or provided with a peripheral lip defining the mould mouth which is closed by the lasted unit when applied to the lip. The arrangement is such that the

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upper-and-insole unit, lasted in any suitable manner, is applied to the lip of the mould and the bottom textile material of the unit is exposed in a hot condition within the mould cavity where in this condition said material is contacted by the injected plastic material. The one or more heating elements are effective to heat the last bottom so that the bottom textile material is at the desired temperature before the plastic is injected.

The foregoing example is illustrated in the accompanying diagrammatic drawing in which Fig. 1 is a side view, partly in section, of a lasted upper-and-insole unit applied to a mould, and Fig. 2 is a section on the line 2-2 of Fig. 1.

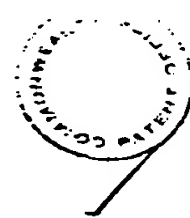
In the drawing, the last (which is of metal) is indicated by 10, the canvas upper by 11, the canvas insole by 12, the plastic outsole (and heel) by 13, the mould base by 14, the slidable side members by 15, each being fitted with a top plate 16 to define the lip of the mouth of the mould cavity, and the entry port for the injector nozzle by 17.

As shown, an electric heating element 20 is fitted into the lowermost portion of the last and extends from toe to heel. A small-bore passage 21 leading from the exterior is provided for the electric wiring.

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Thus, as previously mentioned, in operation the last heated by the electric element or elements thereon is heated to the order of about 100°C. Then the textile upper component, such as a canvas sock, is applied to this heated last. This heating of the last will inherently transfer heat to the area of the textile component that is adjacent to the heating elements mounted therein. This transfer will raise the temperature of such area of the textile component, thus the bottom textile material, to which would generally be of substantially above ambient temperature to the order of 50° - 60°C. Therefore, the textile material is conditioned to be susceptible to penetration by the hot molten settable thermoplastic material without raising the temperature of the textile material to a degree that would damage the fibres thereof. Consequently, when the heated lasted unit is placed in mould closing relation with respect to the moulding cavity and the hot molten thermoplastic material is injected into the cavity into direct contact with the heated textile area, the fact that the textile area that is exposed to the hot plastic has been heated will allow the molten and fluent thermoplastic material to penetrate the intestices of the textile material without forming a skin thereover and thus assuring proper adhesion between the plastic and the textile.

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The claims defining the invention are as follows:

1. A method of manufacturing shoes having woven textile uppers, by injection-moulding, whereby a lasted upper having a sole portion is placed with said sole portion in juxtaposition with a suitably shaped mould, heating the lower portion of the last to a temperature above the temperature which said lower portion would reach by the natural transfer of heat during an injection moulding operation or a succession of said operations, and injecting plastic material in a hot molten condition into the mould to form a shoe outsole, whereby said hot plastic material penetrates the intestices of said sole portion so that upon cooling the outsole adheres to the sole portion of the upper. (24th April, 1962)

2. The method claimed in Claim 1 in which the temperature to which the last is heated is 100°C. (24th April, 1962)

3. An injection moulding apparatus for performing the method claimed in either of the preceding claims including a last incorporating means for directly heating at least the lower portion thereof to a temperature above the temperature which said lower portion would reach by the natural transfer of heat during an injection moulding operation or a succession of said operations, a mould adapted to fit a lasted upper having a sole portion, and means for heating plastic material to be injected into the mould to form a shoe outsole on said sole portion of the upper. (24th April, 1962)

4. Apparatus as claimed in Claim 3 in which the last is formed with at least one internal recess extending along a major part of its bottom portion, and an electric heating element inserted into said recess is adapted to heat at least the lower portion



AMENDED

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10. Apparatus for manufacturing shoes having
woven textile uppers, by injection-moulding,
substantially as herein described and as illustrated
by the accompanying drawings. (24th April, 1962)

DATED this 8th day of November, A.D. 1966

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of the last.

(24th April, 1962)

5. Apparatus as claimed in Claim 4 in which the heating element extends substantially from toe to heel of the last.

(24th April, 1962)

5 6. Apparatus for manufacturing shoes having woven textile uppers, by injection-moulding, comprising a last incorporating means for directly heating at least the lower portion thereof to a temperature above the temperature which said lower portion would reach by the natural transfer of heat during an injection-moulding operation or a succession of said operations, a mould consisting of a base and a pair of separate side members which are slidable upon the base to adjoin at the toe and heel ends of the last to form with the base a cavity having the shape of a plastic sole to be formed in the mould, and means for heating plastic material to be injected into the mould to form a shoe ^{outsole on a sole portion of} ~~sole on~~ a lasted upper applied to the mouth of said mould. (24th April, 1962)

10 15 20 7. Apparatus as claimed in Claim 6 in which the side members are formed or provided with a peripheral lip defining the mould mouth which is intended to be closed by the lasted upper when applied to said lip.

(24th April, 1962)

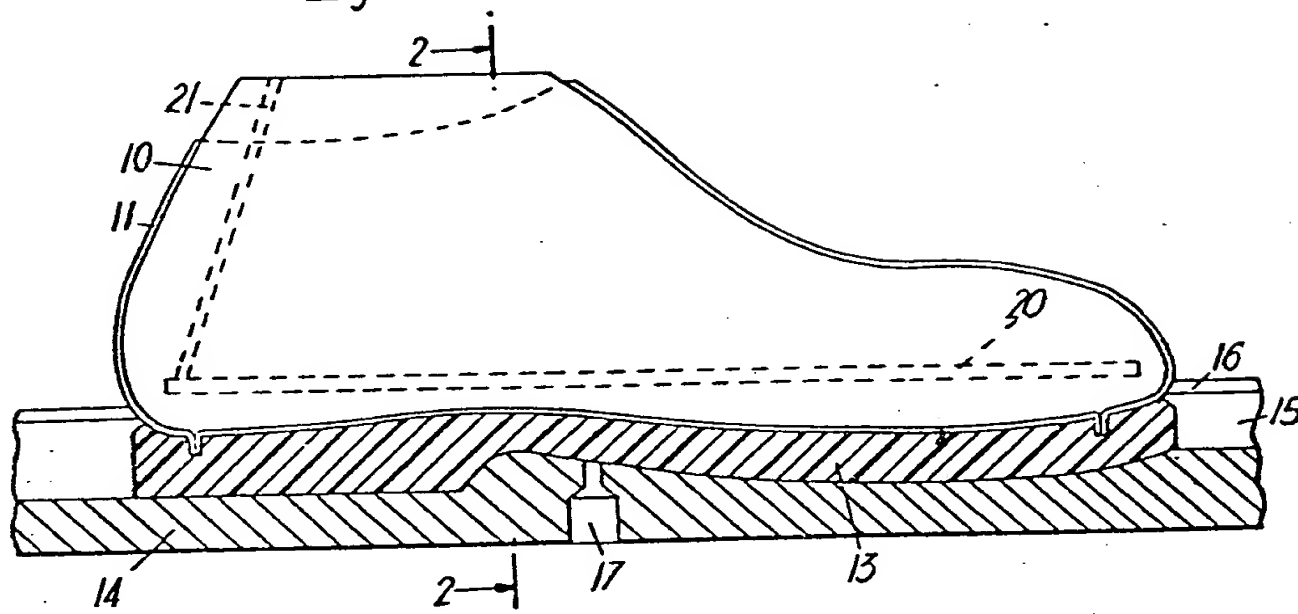
25 8. The method of manufacturing shoes having woven textile uppers, by injection-moulding, substantially as herein described and as illustrated by the accompanying drawings. (24th April, 1962)

30 9. A shoe having a woven textile upper made by the method claimed in any of Claims 1, 2 or 8.

(24th April, 1962)



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Fig. 1.Fig. 2